European Journal of Public Health, Vol. 33, No. 5, 785–788

https://doi.org/10.1093/eurpub/ckad107 Advance Access published on 8 July 2023

Defining medical deserts—an international consensus-building exercise

Monica G. Brînzac[1,2,3], Ellen Kuhlmann[4,5], Gilles Dussault[6,7], Marius I. Ungureanu[1,3], Răzvan M. Cherecheș[1], Cătălin O. Baba[1]

1 Department of Public Health, Faculty of Political, Administrative, and Communication Sciences, Babeș-Bolyai University, Cluj-Napoca, Romania
2 EUPHAnxt, European Public Health Association, Utrecht, The Netherlands
3 Center for Health Workforce Research and Policy, Faculty of Political, Administrative and Communication Sciences, Babeș-Bolyai University, Cluj-Napoca, Romania
4 Institute of Epidemiology, Social Medicine and Health System Research, Hannover Medical School, Hannover, Germany
5 Health and Health Systems, Faculty I, University of Siegen, Siegen, Germany
6 Institute of Hygiene and Tropical Medicine, Lisbon, Portugal
7 World Health Organization Collaborating Centre for Health Workforce Policy and Planning, Lisbon, Portugal

Correspondence: Monica Georgiana Brînzac, Department of Public Health, Babeș-Bolyai University, No. 7 Pandurilor Street, Universitas Building, 9th Floor, Cluj-Napoca 400095, Romania, Tel: +40 264 402 215; e-mail: monica.brinzac@publichealth.ro

Background: Medical deserts represent a pressing public health and health systems challenge. The COVID-19 pandemic further exacerbated the gap between people and health services, yet a commonly agreed definition of medical deserts was lacking. This study aims to define medical deserts through a consensus-building exercise, explaining the phenomenon to its full extent, in a manner that can apply to countries and health systems across the globe. **Methods:** We used a standard Delphi exercise for the consensus-building process. The first phase consisted of one round of individual online meetings with selected key informants; the second phase comprised two rounds of surveys when a consensus was reached in January 2023. The first phase—the in-depth individual meetings—was organized online. The dimensions to include in the definition of medical deserts were identified, ranked and selected based on their recurrence and importance. The second phase—the surveys—was organized online. Finally, external validation was obtained from stakeholders via email. **Results:** The agreed definition highlight five major dimensions: 'Medical deserts are areas where population healthcare needs are unmet partially or totally due to lack of adequate access or improper quality of healthcare services caused by (i) insufficient human resources in health or (ii) facilities, (iii) long waiting times, (iv) disproportionate high costs of services or (v) other socio-cultural barriers'. **Conclusions:** The five dimensions of access to healthcare: (i) insufficient human resources in health or (ii) facilities, (iii) long waiting times, (iv) disproportionate high costs of services and (v) other socio-cultural barriers—ought to be addressed to mitigate medical deserts.

Introduction

The lack of Universal Health Coverage is a pressing issue for health systems worldwide.[1] In numerous countries, part of the population does not have access to the health services they need, because they live in so-called 'medical deserts'.[2] There is evidence that delayed or avoidance in accessing healthcare leads to increased morbidity and mortality connected to acute and chronic illnesses, including mental health issues.[1] The term medical desert derives from the expression 'food deserts', coined in the UK in 1995 and prevalently used in the USA and Canada to denote 'disadvantaged geographic area in which residents have restricted access to healthy, affordable, fresh food from a supermarket'.[2]

The term 'medical deserts' started being used in the last decade, predominantly in France, to denote areas in which individuals have insufficient access to healthcare, due to a low number of providers of services, long waiting times to have access to a health professional, and long travel distances to facilities.[2–4] In the USA, the term 'deserts' is used in association with different medical specialities or services such as 'surgical deserts', 'maternity care deserts', 'gynaecological deserts', 'trauma deserts', 'pharmacy deserts' and 'contraception deserts'.[5–10] Other expressions are 'medically underserved areas', referring to an insufficient supply of health workers in a specific geographic area and 'medically underserved populations', which refers to an inadequate supply of health workers to attend to the needs of a particular group of people within a specific area.[11] These terminologies do not include financial, social or cultural barriers as causes for the limited access to healthcare.[11,12]

The expression 'medical desert' does not have a formal, globally accepted definition, which influences negatively the effectiveness of policies to counteract the effects of medical deserts, as there are no defined areas to specifically target with policies in lack of a definition.[13] Living in a medical desert impacts individuals and society in medical and economical terms.[14,15] Evidence shows that delayed healthcare access translates into higher morbidity and mortality levels.[1] Inhabiting in a medical desert also has adverse effects on the health services system, when individuals require more complex and costlier services when compared with normal access to healthcare, burdening the system and on families, who need to take care of the sick and have to incur related expenses, for instance, due to missed workdays.[16–18] In many countries, the loss of health professionals to emigration augments and deepens medical deserts.[19]

This study aims to fill a gap in the knowledge concerning medical deserts. It introduces an agreed definition that is based on a consensus-building exercise and could apply to any country while considering the specificities of individual health systems. The

exercise focused on the conceptual dimension of the definition of medical deserts because it is essential for developing informed policy recommendations and designing interventions targeting the defined areas of medical deserts. The study adds new knowledge that contributes to the harmonization of research and facilitates cross-country comparisons of access (or lack thereof) to health services as the consensus building exercise reunited experts across countries and continents.

Methods

Study design

The consensus-building exercise consisted of a standard Delphi exercise, a participatory research process using a mixture of quantitative and qualitative data analysis,[20,21] intended to obtain detailed information from a selected body of experts and produce consensus.[22] The Delphi exercise was chosen as method for creating consensus as its primary purpose is to create a reliable consensus opinion and it removes biases such as dominance and group conformity.[20] Additionally, the Delphi method is demonstrated to be an accurate measurement tool in creating novel concepts and guiding the course of future-focused research.[23] As no agreed upon definition of medical deserts exists and the field of medical deserts is relatively new and under researched, the Delphi method was the best method to inform this study. A two-phase Delphi exercise with a final external validation round was planned.

The first phase consisted of one round of online individual meetings with all selected key informants. The second phase consisted of two rounds of surveys with controlled feedback directed to the panel,[23] to support the authors in the progressive development of a valid definition.[24] External validation by stakeholders complemented the Delphi exercise.

Each phase had a different objective and expected outcome. The objective of the first step of the consensus building exercise was to qualitatively identify the relevant dimensions to be included in the definition of medical deserts, based on the expert's opinions, the ranking of the dimensions from 'crucial to include' to 'nice to have in the definition' and their general opinion and insights on defining medical deserts. The initial list of dimensions to be used included the following items: economic accessibility, the supply of health workforce, the demand and need of health services, the demographic profile of the catered population, waiting times, access to healthcare and qualitative services, availability of medical services, practitioner and number of healthcare facilities to population ratio, socio-cultural and financial barriers in accessing healthcare.

The objective of the second step of the Delphi exercise was to reach consensus on the medical deserts' definition. Based on the data gathered in the first phase, a definition of medical deserts was drafted with the most recurrent dimensions and submitted to the panel using Qualtrics, where the key informants could provide feedback on appropriateness, clarity and completeness, needed improvements and missing elements. The definition underwent two rounds of feedback until consensus, defined as an 80% agreement by the research team at the beginning of the research process, was reached. The output of this phase beings the final definition.

The objective of the external validation was to objectively validate the definition. The output of this phase beings a valid final definition.

Selection of Delphi panel

The selection of the panel of experts used a snowballing technique. The panel started with researchers selected based on their experience working on topics related to medical deserts, who were later requested to provide recommendations for additional experts to include. Eighteen stakeholders were identified and invited via email, of which 12 responded, with a response rate of 66.66%. Email invitations were sent to a non-probability purposive sample of 18 participants inviting them to take part in this Delphi study. The experts were from Europe (France, Germany, Italy, Portugal, Finland and Romania), the USA (institutions in Washington, DC, Baltimore and Alexandria) and Africa (South Africa). To make sure that the invited participants met the inclusion criteria, sampling was done purposive. All participants had to be at least 18 years old, fluent English speakers and engaged in ongoing research in medical deserts or closely related fields. To complete the Delphi process participants had to take part in an online meeting and respond both survey rounds. This study aimed to recruit and complete the process with 10 experts. The 12 experts have diverse backgrounds and profiles, varying from academics, policymakers and researchers to geographers. External stakeholders were selected based on the recommendations of the Delphi panel. The external stakeholders' involvement in the consensus-building process is limited compared with the Delphi panel key informants, as they were involved at the end of the process to provide feedback on the final definition of the consensus-building exercise. The definition was validated by two reviewers working in academia at European level.

Procedures for the consensus building exercise

Communications related to the consensus-building exercise on defining medical deserts were carried out via email, with one online meeting. The initial invitation was sent via email, containing a study description and an invitation to an online meeting. Non-responders received two additional reminders, and the first phase was carried out until April 2022. For the second phase, experts received the first draft of the definition in October 2022, and non-responders received two additional reminders. The panel members received a second draft of the definition in December 2022. The first draft of the definition reached an agreement of 79.56%, while the second reached a consensus of 89.04%, the desired consensus being achieved after only two rounds of surveys.

Data collection and analysis

The first phase—the in-depth individual meetings—was organized online, via Zoom. The meetings were recorded, transcribed and analysed. The dimensions to include in the definition of medical deserts were identified, ranked and selected based on their recurrence.

The second phase—the surveys—was organized online, via Qualtrics Surveys. The collected data were downloaded and analysed using descriptive statistics in Excel, and the process was repeated for each round.

In the external validation phase, the final definition was sent via email to the experts with the request to provide feedback on its validity.

The Delphi exercise as described above received the research ethics approval of the Scientific Council of the Babeș-Bolyai University of Cluj-Napoca under reference number 2/13.01.2022.

Results

The first draft of the definition was 'Medical deserts are geographical areas in which people's healthcare needs are unmet due to lack of adequate access or improper quality of healthcare services brought by insufficient human resources in health, scant healthcare facilities, long waiting times, disproportionate high costs of services or other socio-cultural barriers'. The final draft of the definition, based on the feedback received from the Delphi panel and external stakeholders was

> Medical deserts are areas where population healthcare needs are unmet partially or totally due to lack of adequate access or improper quality of healthcare services caused by insufficient human resources in health or facilities, long waiting times, disproportionate high costs of services or other socio-cultural barriers.

In this definition, medical desserts correspond to areas where access to healthcare services is limited, due to a diverse array of barriers, such

as the scarcity of health professionals, limited healthcare facilities, especially in rural areas, long waiting times between the request for an appointment and a consultation, disproportionate high costs of access to services due to associated out-of-pocket expenditure (transport, loss of income) and other socio-cultural barriers, such as, but not limited to, language, religion, cultural norms. In medical deserts, the healthcare needs of an individual can be totally or partially unmet, as access to services may be hindered completely or solely to a specific service or speciality. The dimension 'insufficient human resources' refers not only to numbers, but also their distribution, accessibility, competencies and appropriateness, as per the recommendations of the *Global strategy on human resources for health: Workforce 2030*.[25] The lack of healthcare facilities not only refers to tertiary care units, but typically to primary and secondary care units, such as GP offices, ambulatories, medical laboratories, rehabilitation centres and long-term nursing care centres.[26,27] Rural areas and poor urban zones often represent the pain points of health systems where the number of healthcare facilities is lower.[28,29]

Long waiting times frequently lead to worsened health outcomes for stalled individuals.[30] Additionally, waiting times indicate the functioning of the system, thus, long waiting times point to the strain put on the system and the inability to respond to people's health needs.[31]

The working definition of healthcare needs used for the purpose of the article is 'a deficit in health linked to the potential for effective healthcare intervention'.[32]

The objective of the paper was reached at the phenomena of medical deserts was not explained unidimensional, but rather presented it in a comprehensive manner, starting from the building blocks of a health system (human resources in health, healthcare facilities, financing) and extended into specific dimensions of a health system (waiting times, socio-cultural barriers), allowing the definition to be applied from a managerial, operational approach and from a conceptual perspective.

Discussion

This is the first study pursuing an international definition based on a consensus-building exercise to respond to medical deserts and comprise its determining elements. It is the first comprehensive and agreed upon medical desert definition, advancing the existing knowledge in the field and presenting a basis for further research and policy making.

Developing an agreed definition has repercussions for researchers, healthcare organizations creating care and staffing plans, professional and patient associations and policymakers. The definition could provide a simple structure for targeted training and research in health. We think that the future focus of the concept of the medical desert should be on access to care, care planning, person-centeredness and human resource management, in line with the updated vision of the new multidimensional quality model[33] and consistent with the changing health labour market. It also emphasizes the importance of open communication between organizations, universities, legislators, professionals and individuals about the factors influencing access to healthcare and the medical desert.

The proposed definition covers five dimensions of access: availability, accessibility, accommodation, affordability and acceptability.[12] Accordingly, to mitigate the negative effects of medical deserts, first, the five dimensions of access to healthcare ought to be addressed. Concomitantly, it omits crucial areas such as access to public health and preventive services, which will further influence the health outcomes of the individual and are essential areas of a health system. The definition offers a starting point in identifying areas deficient in ensuring adequate access to healthcare and the dimensions on which policymakers should focus in order to efficiently address the medical desert issue. The literature shows that culturally and linguistically diverse populations have low access to healthcare and experience challenges at multiple levels in the health and social care systems.[34–36] Disproportionate high service costs illustrate another shortcoming of health systems across the globe, as around 100 million individuals are pushed into extreme poverty due to health expenses, having to survive with only $1.90 or less a day.[37] This dimension describes the costs encountered by the individuals that are unbalanced to the care received and are not explained by the skills, devices, technologies or consumables needed for treatment. Moreover, disproportionately high costs are one of the main reasons why people delay seeking care.[34,38] The expert discussions unfolded for the current paper guided the defining process and aimed to forge a definition that may both assist policymakers and researchers in quantifying a medical desert and accurately depicts all its relevant dimensions. Some of the questions that arose in the process and are in need of an answer are 'Are the existence of healthcare facilities enough to accommodate all healthcare needs?', 'An adequate number of human resources in health translates in no medical deserts?' and 'How can we measure healthcare needs?'. We hope that further research will be able to respond to these questions.

The term medical deserts might not be the most appropriate term for defining areas with insufficient access to medical services as it excludes essential domains, such as access to public health and preventive services. We suggest the use of the term 'health deserts' as it encompasses all dimensions of health—physical, mental and social—and the services catering to them. Additionally, an analysis of human resources in health in terms of 'production, inflows and outflows, maldistribution and inefficiencies and regulation' must be carried out.[39]

Acknowledgements

We thank the stakeholders involved in the consensus-building exercise and the external reviewers for their valuable input and support.

Supplementary data

Supplementary data are available at *EURPUB* online.

Funding

This work did not receive specific funding.

Conflicts of interest: None declared.

Author contributions

M.G.B., M.I.U. and R.M.C. had the idea; M.G.B. handled the consensus-building exercise with the support of M.I.U. and R.M.C.; M.G.B. prepared a draft and M.G.B., M.I.U., R.M.C., G.D. and E.K. commented equally and read and approved the final version.

Key points

- Medical deserts are defined as 'Medical deserts are areas where population healthcare needs are unmet partially or totally due to lack of adequate access or improper quality of healthcare services caused by insufficient human resources in health or facilities, long waiting times, disproportionate high costs of services or other socio-cultural barriers'.
- Medical deserts might not be the most appropriate term for defining areas with insufficient access to medical services, as it excludes public health and preventive services.
- We call for a more inclusive approach and suggest 'health deserts' as a term that encompasses all dimensions of health—physical, mental and social—and the services catering to them.

Data availability

The data that support the findings of this study are available from the corresponding author, MGB, upon reasonable request.

References

1 Czeisler MÉ, Marynak K, Clarke KEN, et al. Delay or avoidance of medical care because of COVID-19–related concerns—United States, June 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:1250–7.

2 Rodney A. Food deserts. In: Cook DT and Ryan JM (eds) *The Wiley Blackwell Encyclopedia of Consumption and Consumer Studies*, John Wiley & Sons, Ltd 2015: 1–2. Available at: https://onlinelibrary.wiley.com/doi/full/10.1002/9781118989463.wbeccs123 (2 December 2022, date last accessed).

3 Chevillard G, Lucas-Gabrielli V, Mousques J. "Medical deserts" in France: current state of research and future trends | Cairn International Edition. *L'esp Géographique* 2018;47:362–80.

4 Vergier N, Chaput H, Lefebvre-Hoang I. Déserts médicaux: comment les définir? Comment les mesurer?, 2017. Available at: https://drees.solidarites-sante.gouv.fr/sites/default/files/2020-08/dd17.pdf (21 October 2021, date last accessed).

5 Belsky D, Ricketts T, Poley S, Gaul K. Surgical deserts in the U.S.: Counties without surgeons. *Bull Am Coll Surg* 2010;95:32–5.

6 Wallace M, Dyer L, Felker-Kantor E, et al. Maternity care deserts and pregnancy-associated mortality in Louisiana. *Womens Health Issues* 2021;31:122–9.

7 Friedman S, Shaw JG, Hamilton AB, et al. Gynecologist supply deserts across the VA and in the community. *J Gen Intern Med* 2022;37:690–7.

8 Crandall M, Sharp D, Unger E, et al. Trauma deserts: distance from a trauma center, transport times, and mortality from gunshot wounds in Chicago. *Am J Public Health* 2013;103:1103–9.

9 Wisseh C, Hildreth K, Marshall J, et al. Social determinants of pharmacy deserts in Los Angeles County. *J Racial Ethn Heal Disparities* 2021;8:1424–34.

10 Kreitzer RJ, Smith CW, Kane KA, Saunders TM. Affordable but inaccessible? Contraception deserts in the US states. *J Health Polit Policy Law* 2021;46:277–304.

11 Health Resources and Service Administration. What is Shortage Designation? | Bureau of Health Workforce, 2022. Available at: https://bhw.hrsa.gov/workforce-shortage-areas/shortage-designation (2 December 2022, date last accessed).

12 Penchansky R, Thomas JW. The concept of access: definition and relationship to consumer satisfaction. *Med Care* 1981;19:127–40.

13 Lucas-Gabrielli V, Chevillard G. "Medical deserts" and accessibility to care: what are we talking about?. *Med Sci (Paris)* 2018;34:599–603.

14 Kraft AD, Quimbo SA, Solon O, et al. The health and cost impact of care delay and the experimental impact of insurance on reducing delays. *J Pediatr* 2009; 155:281–5.e1.

15 Guillon M, Celse M, Geoffard PY. Economic and public health consequences of delayed access to medical care for migrants living with HIV in France. *Eur J Heal Econ* 2018;19:327–40.

16 World Health Organization. Disability-Adjusted Life Years (DALYs), 2019. Available at: https://www.who.int/data/gho/indicator-metadata-registry/imr-details/158 (2 December 2022, date last accessed).

17 Trivedi R, Beaver K, Bouldin ED, et al. Characteristics and well-being of informal caregivers: results from a nationally-representative US survey. *Chronic Illn* 2014;10: 167–79.

18 de Zwart PL, Bakx P, van Doorslaer EKA. Will you still need me, will you still feed me when I'm 64? The health impact of caregiving to one's spouse. *Health Econ* 2017; 26:127–38.

19 International Organization for Migration. Migration of Health Workers, 2022. Available at: https://www.iom.int/migration-health-workers (2 December 2022, date last accessed).

20 Nasa P, Jain R, Juneja D. Delphi methodology in healthcare research: how to decide its appropriateness. *World J Methodol* 2021;11:116–29.

21 Trevelyan EG, Robinson N. Delphi methodology in health research: how to do it? *Eur J Integr Med* 2015;7:423–8.

22 Vakil N. Consensus guidelines: method or madness. *Am J Gastroenterol* 2011;106: 225–7.

23 Powell C. The Delphi technique: myths and realities. *J Adv Nurs* 2003;41:376–82.

24 Okoli C, Pawlowski SD. The Delphi method as a research tool: an example, design considerations and applications. *Inf Manag* 2004;42:15–29.

25 WHO. *Global Strategy on Human Resources for Health: Workforce 2030, Geneva*, 2016.

26 World Health Organization. *Monitoring the Building Blocks of Health Systems, Geneva*, 2010: 110.

27 Gulliford M, Figueroa-Munoz J, Morgan M, et al. What does "access to health care" mean? *J Health Serv Res Policy* 2002; 7:186–8.

28 Ahmadi-Javid A, Seyedi P, Syam SS. A survey of healthcare facility location. *Comput Oper Res* 2017;79:223–63.

29 Connor RA, Kralewski JE, Hillson SD. Measuring geographic access to health care in rural areas. *Med Care Rev* 1994;51:337–77.

30 OECD. Waiting Times for Health Services: Next in Line | OECD iLibrary, 2020. Available at: https://www.oecd-ilibrary.org/sites/242e3c8c-en/index.html?itemId=/content/publication/242e3c8c-en (22 December 2022, date last accessed).

31 McIntyre D, Chow CK. Waiting time as an indicator for health services under strain: a narrative review. *Inq A J Med Care Organ Provis Financ* 2020;57; 46958020910305.

32 O'Shaughnessy A, Wright J. Healthcare needs assessment. In: Gulliford M, Jessop E, editors. *Healthcare Public Health: Improving Health Services through Population Science*. Oxford University Press, 2020: 56–68. Available at: https://academic.oup.com/book/33746/chapter/288407796 (23 May 2023, date last accessed).

33 Lachman P, Batalden P, Vanhaecht K, et al. A multidimensional quality model: an opportunity for patients, their kin, healthcare providers and professionals to coproduce health. *F1000Res* 2021;9:1140.

34 Emilio Carrillo J, Carrillo VA, Perez HR, et al. Defining and targeting health care access barriers. *J Health Care Poor Underserved* 2011;22:562–75.

35 Santalahti M, Sumit K, Perkiö M. Barriers to accessing health care services: a qualitative study of migrant construction workers in a southwestern Indian city. *BMC Health Serv Res* 2020;20:1–7.

36 Khatri RB, Assefa Y. Access to health services among culturally and linguistically diverse populations in the Australian universal health care system: issues and challenges. *BMC Public Health* 2022;22:880.

37 World Bank, World Health Organization. World Bank and WHO: Half the World Lacks Access to Essential Health Services, 100 Million Still Pushed into Extreme Poverty Because of Health Expenses, 2017. Available at: https://www.who.int/news/item/13-12-2017-world-bank-and-who-half-the-world-lacks-access-to-essential-health-services-100-million-still-pushed-into-extreme-poverty-because-of-health-expenses (22 December 2022, date last accessed).

38 Adefris M, Abebe SM, Terefe K, et al. Reasons for delay in decision making and reaching health facility among obstetric fistula and pelvic organ prolapse patients in Gondar University hospital, Northwest Ethiopia. *BMC Womens Health* 2017;17: 1–7.

39 World Health Organization. *Health Labour Market Analysis Guidebook, Geneva*, 2021.